Section 10 Incidental Take Permit Application

Application for a Permit for Scientific Purposes Under the Endangered Species Act of 1973.

Incidental Take of Listed Salmon and Steelhead from Washington Department of Fish and Wildlife Hatchery Programs that Collect, Rear and Release Unlisted Fish Species in the Upper Columbia River Basin

December 15, 1999

Washington Department of Fish and Wildlife
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Section 10 Permit Incidental Take Request

I. Title: Request for authorization for the **Incidental Take** of Threatened and Endangered Columbia and Snake River basin salmon and steelhead as a result of Washington Department of Fish and Wildlife hatchery operations that collect, rear, and release unlisted fish species in the Upper Columbia River basin.

II. Date: December 15, 1999

The Washington Department of Fish and Wildlife (WDFW) requests authorization for the incidental take of ESA-listed Columbia and Snake River basin salmon and steelhead associated with non-listed salmon operations, salmon releases and research in the state of Washington, allowing for the continued operation of WDFW hatchery facilities in the upper Columbia River basin under Section 10 of the Endangered Species Act (ESA). This request addresses activities previously covered under Permit # 902 and additional hatchery operation and release activities as outlined below. A permit is required to authorize the incidental take of listed salmon and steelhead associated with 1) the operation of seven hatchery facilities having no federal nexus in the Columbia River basin, and 2) the on-station release or transfer of salmon from those facilities. Permit # 902 expires on December 31, 1999, at which time take authorizations will be necessary for the continued operation of these programs.

III. Applicant: Washington Department of Fish and Wildlife
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IV. Species or Stocks of Concern:

This request for authorization of incidental take of listed species is submitted in response to the expiration on December 31, 1999 of Permit #902, by the March 25, 1999 listing by the National Marine Fisheries Service (NMFS) of Lower Columbia River chum (*Oncorhynchus keta)* as "threatened" and Mid Columbia River steelhead (*O. mykiss)* as "threatened", and by the March 24, 1999 listing of Upper Columbia River spring chinook (*O. tshawytscha)* as "endangered", and Lower Columbia River chinook as "threatened" under the ESA. Species of concern previously referenced in Permits #901 and 902 include Snake River sockeye salmon (*O. nerka)* listed as "endangered" April 22, 1992, Snake River spring/summer chinook listed as "threatened" April 22, 1992, Snake River fall chinook listed as "threatened" November 20, 1991, Snake River steelhead listed as "threatened" August 18, 1997, upper Columbia River steelhead listed as "endangered" August 18, 1997, and lower

Columbia River steelhead listed as "threatened" March 19, 1998. Coastal cutthroat trout (*O. clarki clarki*) in the Columbia River and southwest Washington were proposed for listing as "threatened" April 5, 1999.

The listed populations utilize the upper Columbia River (Upper Columbia steelhead ESU and Upper Columbia Spring-run Chinook ESU), middle Columbia River (Upper Columbia and Mid Columbia steelhead ESUs, Upper Columbia Spring-run Chinook ESU), lower Columbia River (Upper Columbia, Mid Columbia, Lower Columbia, and Snake River steelhead ESUs, Upper Columbia Spring-run Chinook ESU, Lower Columbia chinook ESU, and Snake River spring/summer and fall chinook ESUs, coastal cutthroat ESU), and Snake River (Snake River steelhead ESU, Snake River sockeye ESU, Snake River spring/summer and fall chinook ESUs) as rearing areas as juveniles, and as migration corridors both as juveniles and as returning adults.

V. Proposed Activities Requested Through Permit:

WDFW operates four salmonid hatchery programs that are not under a federal nexus within the upper and mid-Columbia River basin. WDFW also assists or cooperatively manages 8 educational salmon propagation projects within the upper Columbia River system that also lack a federal nexus. Proposed activities for the four salmon enhancement facilities operated by WDFW are detailed within the Hatchery and Genetic Management Plans (HGMPs) for each program (Appendix I). Proposed activities associated with the educational and volunteer salmon enhancement group efforts follow the descriptions of proposed activities for the major facilities ("Section B").

A. Proposed Activities for Major WDFW Facilities -

Four major hatchery supplementation and mitigation programs are operated by WDFW in the upper Columbia River basin. Hatchery and Genetic Management Plans have been completed for these programs and are appended to this request for authorization (Appendix 1).

1) Upper Columbia Summer Chinook Salmon Mitigation and Supplementation Program at Eastbank Fish Hatchery and Wells Fish Hatchery Complexes,

2) Upper Columbia Fall Chinook Salmon Hatchery Program - Priest Rapids Hatchery Complex, and

3) Lake Wenatchee Sockeye Salmon Supplementation Program at Rock Island Fish Hatchery Complex

The appended HGMP for each program provides general hatchery information and details on the program, including a description of its water source and facilities, brood stock, the spawning, rearing,

incubation and release guidelines, its relationship to management objectives, an explanation of monitoring and evaluation of performance indicators, and a description of research associated with the program.

The major facilities are located above the confluence of the Columbia River with the Snake River. These facilities include Priest Rapids Hatchery Complex program for upper Columbia River fall chinook, the Eastbank and Wells hatcheries complex programs for upper Columbia River summer chinook mitigation and supplementation on the mainstem Columbia, and the Rock Island hatchery complex supplementation program for Lake Wenatchee sockeye salmon.

Salmon production goals for the four hatchery programs are reviewed and updated on a consistent basis. Allowable annual production for each species is determined by, and consistent with, ESA protective requirements for listed Columbia and Snake River steelhead, chinook and sockeye populations, fulfillment of federal treaty obligations to Native Americans, fulfillment of court approved actions developed under the auspices of United States v. Oregon, the discharge of fisheries mitigation responsibilities incurred as a result of water development authorizations, and achievement of U.S./Canada Pacific Salmon Treaty obligations (CBFWA 1996). Production levels described in this modification are consistent with allowable levels permitted under current Section 10 Permits #901 and #902, and with the basin-wide annual production ceiling set by NMFS (NMFS 1995).

Existing policies affecting hatcheries in the Columbia River Basin are detailed in the 1995 Integrated Hatchery Operations Team (IHOT) Annual Report (IHOT 1996). Hatchery operation and maintenance protocols are guided by basin-wide policies and standards developed by IHOT, which is a multi agency group with oversight authority for production in the Columbia and Snake river basins. These policies and performance standards are intended to address fish health, genetics, local ecological interactions, hatchery practices, and hatchery operations (IHOT 1996).

Potential effects of these hatchery operations on listed populations may include hatchery salmon predation and/or competition, disease transmission to wild fish, behavioral modification of wild fish, water withdrawal impacts to fish and habitat, and/or water quality changes from hatchery effluents.

Description of Actions Taken to Minimize, Monitor, and Mitigate Effects

It is WDFW's intention to continue to operate the facilities described in the HGMPs with the objective of minimizing effects of released salmon and hatchery operations on wild salmonids, including ESA-listed populations. Steps that will be taken to minimize, monitor, and mitigate any impacts to listed salmon and steelhead, including those populations within the newly listed salmon and steelhead ESUs, will continue to include:

- the production and release of only smolts through fish culture and volitional release practices, fostering rapid seaward migration with minimal rearing or delay in the rivers;
- acclimation to release sites of all salmon that are transferred from main production hatcheries to satellite production facilities to minimize straying;

- coded-wire tagging of all hatchery salmon populations to allow for adequate monitoring of migration, fisheries contribution, and survival;
- continued monitoring and research to investigate the ecological effects of fish culture practices, and to identify salmonid migration timing and behavior;
- compliance with IHOT (1993) guidelines regarding fish health, genetics, local ecological interactions, hatchery practices, and hatchery operations to maintain healthy hatchery and wild salmonid populations;
- compliance with all WDFW fish transfer and disease standards to minimize the risk of disease transference to wild fish;
- consistent achievement of hatchery effluent and best management practice standards set forth in NPDES Permits to avoid adverse affects on wild fish and their habitat; and
- adherence to the annual salmon production ceiling established by NMFS (NMFS 1995) to address ecological carrying capacity concerns in the migration corridors, the estuary, and the marine ecosystem, and to minimize over-all density-dependent effects of hatchery production on listed species.

Detailed descriptions of operation practices and salmon production for each of the hatchery complexes are included in the HGMPs appended to this application.

B. Proposed Activities for Minor Facilities and Educational Programs -

Minor Columbia River Basin Projects Above Bonneville Dam

The Washington Department of Fish and Wildlife is involved in educational and volunteer salmon enhancement projects within the upper Columbia River basin. Minor salmon rearing projects in waters above Bonneville Dam involve the incubation and release of small numbers of chinook salmon for educational purposes, with one exception. In continuation of a volunteer enhancement group program permitted in past years, WDFW produces fall chinook yearlings at Wells Hatchery for out-planting into Lake Chelan for sport fishery enhancement purposes. Appendix II lists the projects involved in incubating eggs and releasing salmon fry in this region.

These educational and cooperative hatchery projects are germane to the effects of production and release of chinook salmon on ESA-listed Columbia and Snake River salmon and steelhead populations. Included in this application is a request for authorization for the potential incidental take of listed Columbia and Snake River Basin salmon and steelhead that might occur as a result of the trapping, production, and release of Pacific salmon associated with these educational and cooperative hatchery projects. Potential effects of these minor hatchery operations on listed salmon and steelhead populations may include hatchery salmon predation and/or competition, disease transmission to wild fish, behavioral modification of wild fish, water withdrawal impacts to fish and habitat, and/or water quality changes from hatchery effluents.

Included in IHOT (1996) are plans for educational and volunteer salmon enhancement projects in the Columbia River Basin. These descriptions detail annual production goals, operational practices employed by the project operators to produce healthy hatchery salmon populations, and measures implemented to minimize effects of the operations and fish releases on wild salmonids.

1. Total Production -
Educational and enhancement projects in the upper Columbia River region are anticipated to produce a total of 5,400 salmon annually. Of this total, 900 fall chinook fingerlings, and 4,500 summer chinook fry/fingerlings may be produced each year. We project that minor project releases into basin waters in the next 5 years will be nearly equivalent to the 1999 totals, with no significant increases in production levels anticipated.

2. Purpose -
The school egg incubation projects are for educational purposes, teaching the students about salmon life history, water quality, and Pacific Northwest history. Salmon eggs, materials necessary to incubate and rear the salmon, and any fish food needed are supplied by WDFW.

3. Goals -
The goals of these projects are to educate students about salmon life history and their need for water quality.

4. Objectives -
Objectives for the operation of educational projects in this region are described in operations plans specific for these projects included in IHOT (1996).

VI. Conservation Plans -

Conservation plans proposed for WDFW and cooperative salmon hatchery operations in the Columbia River Basin to protect ESA-listed salmon were included in the original Section 10 Permit applications submitted to NMFS in 1993, and in several subsequent modifications. These plans reported steps taken at each major and minor hatchery facility to minimize, monitor, and mitigate effects on listed Columbia and Snake River steelhead, chinook and sockeye salmon stocks covered under NMFS Incidental Take Permits #901 and #902. Actions implemented by WDFW under the approved plans that were designed to protect threatened and endangered Columbia and Snake River salmon and steelhead populations will also benefit newly-listed salmon and steelhead populations.

Following is a conservation plan for three upper Columbia River facilities and projects operated by the Washington Department of Fish and Wildlife, modified from the original plans to including reports of anticipated effects on listed salmon and steelhead populations, anticipated effects on habitat of ESA-listed salmon and steelhead, and steps taken to monitor, minimize, and mitigate effects of hatchery

operations and salmon releases on listed salmon and steelhead. A conservation plan for the three primary upper Columbia River Basin hatchery complexes is presented first, followed by a description of conservation actions for the minor educational and volunteer enhancement projects in the basin.

A. CONSERVATION PLAN FOR MAJOR FACILITIES -

(i) Anticipated Impact on Listed Salmon and Steelhead Stocks

1. Adult Collection

Wenatchee, Methow, Entiat, and Okanogan river system-origin wild steelhead commence freshwater spawning migration in early July, extending through the end of June the following year (Chapman et al. 1994; NMFS 1996a). Peak migration into the region occurs in early September. Early "A-run" Snake River Basin wild steelhead enter freshwater in May, with peak migration for the total (A-run and B-run) return occurring in October, one month later than the upper Columbia stocks. Migration of later "B-run" fish into the Snake River region extends through the end of October (NMFS 1996a). Snake River fish tend to over-winter in the mainstem Snake River at a much higher rate than is observed for upper Columbia River steelhead in the mainstem Columbia during migration. Also, temperature blockages often delay steelhead entry into the Snake River. Similar migrational delays do not occur in the upper Columbia region.

Wenatchee, Entiat and Methow river-origin spring chinook begin migration into the Columbia River in late March to early April. Tributary entry into the Wenatchee system is May to August and fish entering the Wenatchee River system may be delayed by a hydrological block in Tumwater canyon on the Wenatchee River (WDF et al. 1993). Entry into the Entiat and Methow tributaries is in May and June, with peak spawning from August through early September.

a. Priest Rapids Hatchery -

Upstream migrating wild steelhead native to the upper Columbia River drainages, and possibly, Snake River system wild steelhead, may be incidentally encountered as strays during fall chinook broodstock operations occurring between early September and mid-November at Priest Rapids Hatchery. A maximum total of 10 adult steelhead are encountered each year at the trap during chinook broodstock collection (1986-95 base year estimate from Paul Pederson, WDFW, pers. comm. June 1997). The incidence of wild steelhead straying to this facility is low. Run timing separates the migration of upper Columbia River spring chinook stocks from fall chinook stocks.

The primary broodstock collection consideration is to achieve an escapement of 6,102 adults to the hatchery. Fall chinook are collected from the run at large captured in the volunteer trap from September through November. Broodstock are collected across the entire run to ensure that the run timing for the population is maintained.

Marked stray salmon from programs outside the mid-Columbia would be removed from the hatchery broodstocks, when it appears that the percentage of strays from a given program exceeds 5%. This provisional standard is based upon the NMFS Biological Opinion of system wide hatchery operations in the Columbia River (NMFS 1999), and will be revised when results from ongoing region-wide analyses of genetic introgression from straying provides more definitive direction.

Adverse effects on listed fish that may be encountered incidentally during trapping, are minimized through the following measures:

a. The Priest Rapids Hatchery trap will be continuously monitored and operated 3 days per week during the hatchery fall chinook migration (September 1 through November).

b. The hatchery trap is located in the hatchery outlet channel ½ mile upstream from its confluence with the Columbia River. A fish weir is not used to guide fish into the hatchery outlet. All fish returning to Priest Rapids Hatchery recruit to the trap as volunteers. The trapping program is therefore not a "run of the river" operation, and captures of other species besides fall chinook salmon that were produced at the hatchery are minimal.

c. Other salmonids incidentally trapped will be returned into the outlet channel to continue their migration.

b. Turtle Rock Salmon Hatchery -

No adult fish are captured at the Turtle Rock facility, and no effects on listed chinook or steelhead are expected from the operation. Summer/fall chinook eggs are transferred from broodstock captured as volunteers to Wells Hatchery for the sub-yearling and yearling programs.

The lack of a hatchery return site for chinook released from this facility may lead to straying of fall chinook adults into spawning areas that are important for spring chinook and steelhead. Because of temporal separation between wild spring chinook, steelhead and fall chinook spawning, and the different spawning habitat requirements for the species, it is unlikely that straying of Turtle Rock chinook to steelhead or spring chinook spawning areas will have a significant effect on steelhead or spring chinook spawning activity or success.

c. Eastbank Hatchery Complex -

Upper Columbia River ESU-origin steelhead and chinook, and stray Snake River ESU steelhead may be encountered incidental to salmon broodstock collection operations associated with the Rock Island Settlement facilities (Eastbank Hatchery complex). ESA-listed steelhead migrating in the Wenatchee River may be trapped, handled, retained for recovery program broodstock or passed upstream during summer chinook broodstock collection operations occurring between late July and late October at Dryden Dam, or in sockeye salmon trapping operations beginning in mid- July at Tumwater Dam (Eltrich et al.1994a; Eltrich et al. 1994b Eltrich et al. 1995). Collection of listed steelhead adults is authorized under Section 10 Permit #1094, issued by NMFS on February 4, 1998. Concurrent species broodstock collection protocols, promulgated annually, are designed to minimize adverse adult trapping impacts to all species normally encountered.

Summer chinook broodstock are collected from the run at large reaching Dryden and Tumwater Dams during the months of July and August. Measures to reduce the risk of adverse genetic effects to the population include a collection date beginning no earlier than July 15 to exclude spring-run chinook from the brood stock. ESA-listed spring chinook which may be incidentally trapped after July 15 can be distinguished from the recently arriving summer chinook by external coloration and body conformation. Listed spring chinook thus identified will be passed upstream with minimal delay.

d. Wells Salmon Hatchery -

Methow and, to a lesser extent, Okanogan river system wild steelhead may be encountered at the Wells Salmon Hatchery in the Wells Dam left and right bank ladder traps, and at the hatchery trap during spring chinook, summer chinook, and fall chinook broodstock procurement operations from early May through November. In 1996, the Wells Hatchery staff captured and passed upstream 17 adult steelhead during spring chinook brood collection between mid-May and early July (H. Bartlett, WDFW, pers. comm. June, 1997). An additional 19 adult wild steelhead were collected in 1996 at Wells between mid-July and late October, when both summer chinook and steelhead are trapped for use as broodstock. These latter steelhead, although not lacking adipose fins, are thought to be hatchery-origin or of hatchery lineage, and were retained as broodstock for the Wells complex hatchery program. We estimate that an annual total of 30-40 steelhead are encountered during salmon broodstock collection efforts within the Wells Dam ladders each year (K. Petersen, WDFW, pers. comm. June 1997). All steelhead encountered that are not retained as broodstock, as authorized by Permit #1094, move through the traps with no significant handling or delay. Run timing of spring chinook and summer chinook are somewhat distinct. No other chinook populations are present in the project area during the July-August summer chinook broodstock collection period. The risk of adverse genetic effects to the population is diminished by operating the adult collection between the dates of June 28 and August 28 to exclude spring-run and fall-run chinook from collections. ESA-listed spring chinook which may be incidentally trapped after June 28 can usually be distinguished from the recently arriving summer chinook by external coloration and body conformation. Unless needed for authorized recovery program broodstock, listed spring chinook thus identified will be passed upstream with minimal delay.

Measures to reduce sources of bias that could lead to a non-representative sample of the desired Methow/Okanogan basin summer chinook brood stock sources include trapping all fish randomly from the run at large and throughout the duration of passage to ensure proportional representation of the age and size structure of the returning population. Additional measures employed to reduce the risk of adverse genetic effects to the population is a collection date beginning no earlier than June 28 and ending no later than August 28 to exclude spring-run and fall-run chinook from collections. Hatchery summer chinook volunteering to the hatchery trap can be separated by origin through CWT analysis. This process will allow differentiation between Carlton, Similkameen, and Wells hatchery-origin fish (as well as out-of-basin strays) prior to spawning and maintenance of separate local broodstocks for each production area as necessary.

Adverse effects on the natural summer chinook population, and on listed fish that may be encountered incidentally during trapping, are minimized through the following measures:

- The east ladder (and west ladder) trap(s) will be continuously monitored and operated 3 days per week during the summer chinook migration (June 28 through August 28). The east ladder trap is actively manned during trapping and the west ladder trap is passively operated and checked at least daily, ensuring minimal holding times for fish captured.

- The Wells Hatchery trap does not incorporate a fish weir to guide fish into the hatchery fish ladder. All fish returning to Wells Hatchery recruit to the trap as volunteers. The trapping program is therefore not a "run of the river" operation, and captures of other species besides summer chinook salmon that were produced at the hatchery are minimal.
- To minimize migration delays to fish other than the targeted species, the fish sorting flume in the west ladder trap will be staffed at all times while the fishway is barricaded for the purpose of guiding fish into the trap. Attraction flows from the false weir will be maintained to encourage fish to use the sorting flume.

- The traps will be operated in a manner to reduce retention time in the holding pools above the *Denil* fishways accessing the trap.

- Fish not required for broodstock will be returned into the fishway as they move through the sorting flumes to continue their upstream migration.

The target populations are the Wenatchee River and Methow/Okanogan summer chinook populations. These populations are included as part of the Upper Columbia Summer/Fall Chinook ESU (Myers et al. 1998). No other chinook population are present in the project area during the July-August broodstock collection period. Summer chinook adults recruiting to the Wells Hatchery trap are a mixture of natural and hatchery-origin fish, and identified by CWT-adipose clip combinations. Gametes secured from these spawners are only used in the Wells Hatchery and Turtle Rock Hatchery release programs, and smolts are not released in areas above Wells Dam.

The Wells Dam east-ladder-trapped summer chinook (Methow/Okanogan stock) and summer chinook collected at Dryden and Tumwater dams (Wenatchee stock) are held separately in adult holding ponds at Eastbank Hatchery. Summer chinook broodstock collected as volunteers at Wells Hatchery are held to maturity in an adult holding pond at Wells Hatchery until spawned. No takes of listed fish occur through these broodstock holding operations.

e. Level of incidental take -

The level of incidental take of listed salmon and steelhead resulting from broodstock collection operations in the upper Columbia River regions is unknown. Precise quantification of mortality levels of adult listed salmon and steelhead is not possible, due to the inherent biological characteristics of the listed fish and the scale and variability of the Columbia Basin river systems.

As indicated above for each adult collection operation, low total numbers of listed salmon and steelhead are encountered each year incidentally to regional fall and summer chinook and sockeye salmon broodstock collection efforts. Furthermore, we believe that actions directed towards wild steelhead and salmon protection that are implemented in the operations will minimize impacts on listed salmon and steelhead that are incidentally taken. Spawning protocols for the upper Columbia River salmon hatchery complexes call for minimal holding, handling, and careful release of any listed salmon and steelhead adults encountered incidentally in the subject salmon broodstock trapping operations. Further, the annual broodstock trapping protocols carefully integrate the various species' biological, escapement, and broodstock objectives to avoid unnecessary duplication of trapping effort or impact to natural populations. Traps at the facilities are continuously monitored, insuring that the duration of time that salmon and steelhead are retained is minimal. Impacts to any listed salmon and steelhead that are trapped, handled, and released during salmon broodstock collection activities will not be significant.

2. Juvenile Interactions

Listed steelhead and salmon occurrence and smolt migration timing -

Wild Upper Columbia ESU steelhead are present year-round in the Wenatchee, Entiat, Okanogan, and Methow basin river systems, and likely rear and over-winter in the mainstem upper Columbia River. Wild-origin steelhead smolts in this ESU migrate seaward as two and three year-old fish (Peven 1990). Naturally produced upper Columbia-origin steelhead smolts out-migrating downstream past Rock Island Dam average 160-180 mm fork length (Peven and Fielder 1988; 1989; 1990; Chapman et al. 1994a).

Steelhead smolts from this region exhibit peak passage at Rock Island Dam ranging from May 13 (1987 observations reported in Peven et al. 1987) to May 23 (1985 observations reported in FPC 1987). The 1985-1989 average peak migration is May 18 (Peven and Fielder 1989). Central 80 % passage at the dam ranged between May 6 (10 %) and May 31 (90 %) based on 1985-89 observations (Peven and Fielder 1989).

Steelhead smolts originating above McNary Dam and representing upper Columbia and Snake river-origin populations exhibit average peak passage at McNary Dam from May 7 through May 26 (1984-86 observations reported in Fish Passage Center (FPC) 1987). Steelhead smolt travel time from the Methow River to McNary Dam ranges from 14 to 20 days, dependent upon mainstem river flows (Chapman et al. 1994). Central 80 % passage of the out-migrating smolt population at McNary ranged between April 25 (10 %) and May 22 (90 %) based on 1984-86 smolt passage observations (FPC 1987).

Steelhead yearling migrational peaks in the Columbia River estuary have been observed to occur from the second through the fourth week in May (1978-83 data from Dawley et al. 1986).

Annual variances in downstream migration timing of hatchery fish occur, and are associated with flows

during spill periods (FPC 1987) and/or hatchery release dates (Chapman et al.1995). Chapman et al. (1995) found that hatchery release date was the major factor determining seaward migration timing for spring chinook, but steelhead migration timing appeared to be driven by both release date and river flow (Chapman et al. 1994a). Summer steelhead sub-yearling out-migration speed was found to be strongly related to fish size (larger fish move faster), with no evidence of a relationship between migration speed and flow volumes (Chapman et al. 1994b). Generally, high river flows have been observed to cause faster salmon migration through the river (Dawley et al. 1986).

Natural sub-yearling chinook fry spend a few days to several months in areas from which they emerged. Snorkel observations on the Wenatchee River indicate that ocean-type chinook salmon emergence occurs from mid-February to the end of April, and many move downstream to the mainstem Columbia River during their first year. Most probably depart from tributaries by mid-July (Chapman et al. 1994). Natural fish emerge at a size of 39 - 41 mm fl, based on size ranges recorded for swim-up fish in the WDFW hatcheries rearing summer chinook. Hillman and Chapman (1989) reported that chinook in the Wenatchee River in 1986 increased in mean fork length from 48 mm in June to 84 mm. In 1987, chinook increased in mean size from 70 mm in July to 79 mm in October. Given the April-May and June release timing for hatchery yearling and sub-yearling fish, respectively, the hatchery fish may encounter natural-origin fish in the tributaries and upper Columbia mainstem ranging in size from 40 mm to around 50 mm. Relatively large yearling hatchery fish recently released from acclimation ponds may interact with recently-emerged natural fish. Their habitat uses would probably differ, because of size-specific habitat and forage needs (BAMP 1998).

Naturally produced summer/fall chinook in the region emigrate seaward as sub-yearlings. All summer/fall sub-yearlings leave areas where they incubated in the mainstem Columbia within days to several weeks after they emerge from the redd. Fry emerge mostly in April and May. Natural Hanford Reach fall chinook fry emerge at a size of 38 - 39 mm fl. After emergence, some fry move downstream to rear. Others rear for a time in natal spawning areas before they move extensively.

Sub-yearling fall chinook produced in Hanford Reach leave the Reach before the end of July. Fish departing the Reach over this period range in size from 38-39 mm (April) to 83 mm (July). Most fish depart before mid-July, and many rear in McNary Dam pool before they pass McNary Dam. Studies in 1991 and 1992 indicated an estimated median arrival time of Hanford Reach-origin fall chinook at McNary Dam in late July or early August. June migrants from Hanford Reach averaged 90 - 108 mm upon reaching McNary Dam.

Summer/fall chinook sub-yearlings produced in upper Columbia tributaries and in tailraces of dams upstream from Rock Island Dam spend several weeks rearing in the dam reservoirs before they arrive at Priest Rapids Dam in August and later. Mid-July migrants passing over Wanapum and Priest Rapids dams are over 100 mm fl. This extended rearing and migration period (attributed to migrational delay caused by hydropower project construction) leads to arrival at McNary Dam in late August to late fall. Sub-yearlings produced in the Wanapum Dam tailrace may pass Priest Rapids Dam earlier, most likely

in June and July. Late passage of sub-yearlings into the upper Hanford Reach probably has increased the proportion of sub-yearlings that remain in the Columbia River downstream of McNary Dam through winter. It also has substantially increased the mean size of sub-yearlings at the time of passage past Priest Rapids Dam.

Upper River tributaries and mainstem above the Snake River -
Releases of hatchery-reared yearling spring and summer, and fall chinook in the upper Columbia river region occur in April or May, while sub-yearling hatchery fish are released during June and July (WDFW Hatcheries Program hatchery salmon liberation data, June 9, 1997). Recent year average release dates for salmon species produced at the five mid and upper Columbia River hatchery complexes are presented in Table 1.

Peak passage of the above species in the Columbia River mainstem subsequent to hatchery release, as monitored at Rock Island Dam, occurs from mid-April to mid-May (FPC 1987), with a 1985-90 six year average peak of May 21 (Peven and Fielder 1990). Six-year average (1985-90) central 80 % passage at Rock Island for each species produced in the four hatchery complexes located upstream is presented in Table 2, taken from Peven and Fielder (1990). Six year average steelhead smolt passage timing is included for comparison.

Table 1. 1990-95 average liberation dates for mid and upper-Columbia River hatchery-origin salmon (WDFW Hatcheries Program data - June 9, 1997).

Species (class)	**Average release date (range)**
Fall chinook (yearling)	**April 30** (April 21 - May 13)
(sub-yearling)	**June 15** (May 4 - July 10)
Spring chinook (yearling)	**April 16** (April 15 - April 18)
(sub-yearling)	**May 10** (March 19 and July 2)
Summer chinook (yearling)	**May 2** (April 7 - May 24)
(sub-yearling)	**April 25** (January 21 - July 20)
Coho (yearling)	**May 3** (May 1 - May 5)
Sockeye (fingerlings -Wenatchee Net-pens)	**Sept. 13** (June 21 - October 26)
Steelhead (all ages)	**June 20** (January 4 - November 28)

Table 2. 1985-90 average juvenile salmonid passage dates at Rock Island Dam

	Average Date of Percent Population Passage		
Species	**10 %**	**50 %**	**90 %**
Chinook yearling	April 20	May 7	May 23
Chinook sub-yearling	June 3	July 3	August 2
Coho	May 14	May 22	May 30

Sockeye	April 15	April 30	May 30
Steelhead	May 6	May 18	May 31

2. Mainstem Columbia below confluence with the Snake River -

Peak migration of yearling chinook over McNary Dam occurs from mid to late May, with peak passage of sub-yearling chinook occurring in mid-July (Johnsen et al. 1990). Following are 1984-86 average passage dates at McNary Dam for species released from mid and upper-river WDFW hatcheries (Table 3 - data from FPC 1987). Average steelhead smolt passage timing is included for comparison to salmon passage timings. These data will reflect time periods when out-migrating steelhead and salmon interact in the mainstem Columbia below the confluence with the Snake River.

Table 3. 1984-86 average juvenile salmonid passage dates at McNary Dam.

	Average Date of Percent Population Passage		
Species	**10 %**	**50 %**	**90 %**
Chinook yearling	April 15	May 11	May 26
Chinook sub-yearling	June 11	July 11	August 2
Coho	May 24	June 1	June 8
Sockeye	May 1	May 20	June 9
Steelhead	April 27	May 20	June 5

3. Columbia River estuary -

Timing of salmonid smolt migrations into the estuary is primarily dependent on dates of release from hatcheries and river flow (Dawley et al. 1986). Yearling chinook and coho salmon have been observed to peak in migration in the Columbia River estuary from the second through the fourth week in May (Dawley et al. 1986). Sub-yearling chinook peak in the Columbia River estuary generally in the first or second week in June. Chapman et al. (1994b) report that the migratory behavior of sub-yearling chinook in the Columbia River differs fundamentally from that exhibited by yearling chinook. In contrast to rapid out-migration by yearlings, sub-yearlings tend to forage and rear throughout the dam impoundments and migrate seaward much more slowly.

Table 4 presents 1978-83 average peak migration weeks in the Columbia River estuary for salmon species released from the two lower river hatchery facilities (Dawley et al.1986). These timing data indicate peak time periods of migratory overlap between out-migrating steelhead and salmon smolts in the estuary.

Table 4. 1978-83 average migrational peaks for juvenile salmonids from Jones Beach beach seine and purse seine catch per set data (Dawley et al. 1986).

Average Week of Peak Migration

Species - class	Peak Week
Chinook - yearling	May 12 - 18
Chinook - sub-yearling	June 12 - 18
Coho - yearling	May 19 - 25
Steelhead- yearling	May 14 - 20

Although not included in Table 4, timing of sockeye movement through the estuary coincides with coho, steelhead, and yearling chinook migratory timings (Chapman et al. 1995). Migrational rate information suggests that salmon and steelhead smolt movement through the estuary is quite rapid (average 3 days), and that the duration of interaction between hatchery salmon and steelhead is minimal.

Like steelhead smolts, juvenile salmon reaching the Columbia River estuary have been shown to move rapidly seaward. Salmon smolts have been shown to travel downstream in the estuary at rates ranging from 1 to > 59 km/day for sub-yearling chinook, 5 to > 59 km/day for yearling chinook, and 12 to > 59 km/day for coho (1978 and 1980 data from Dawley et al. 1986). Dawley et al. (1986) reported that these movement rates represented a 30 % decrease for sub-yearling chinook, no change for yearling chinook, and a 40 % increase for coho compared to movement rates recorded for these species when migrating from up-river areas to the estuary. Assuming an average out-migration rate of 30 km/day from the above ranges, and a distance from Jones Beach to the ends of the jetties at the mouth of the Columbia River of 75 km (Dawley et al. 1986), chinook and coho salmon smolts would be expected to completely travel through the Columbia estuary in approximately 3 days.

b. Anticipated interactions between hatchery released salmon and listed salmon and steelhead - Average hatchery liberation and dam passage data indicate that salmon smolts released from the middle and upper Columbia River hatchery complexes may encounter listed Columbia River and Snake River ESU wild steelhead and salmon juveniles rearing in the individual river areas and in the mainstem Columbia River. Out-migrating salmon and steelhead smolts from these ESUs will also overlap spatially and temporally with yearling hatchery salmon releases, but not with sub-yearling spring, summer, or fall chinook releases (later hatchery release times), in the individual rivers, in the mainstem Columbia, and in Columbia estuarine areas. In the mainstem Columbia below the confluence with the Snake River and in the Columbia River estuary, out-migrating Snake River Basin listed salmon and steelhead smolts will also likely encounter migrating yearling hatchery salmon, but not sub-yearling spring, summer, and fall chinook. In the lower mainstem Columbia and in the estuary, yearling salmon released from the middle and upper Columbia River hatcheries will also likely overlap to some degree in migration timing with listed Lower Columbia ESU salmon and steelhead smolts.

Spatial and temporal interaction between listed wild salmon and steelhead juveniles and hatchery-released chinook and sockeye smolts may lead to several types of adverse effects on the listed natural populations: predation, competition, behavioral alteration, and disease transmittal.

1. Tributary and mainstem effects -

a) Predation -

As indicated in the preceding section describing anticipated upper Columbia River region hatchery release effects, there is likely a low risk of predation by hatchery chinook and sockeye salmon smolts on listed wild salmon and steelhead juveniles due to minimal spatial and temporal overlap. Juvenile listed salmon and steelhead rearing in mainstem areas downstream of yearling coho release sites may be more susceptible to increased predation by that hatchery species, although the duration of interaction is limited due to the tendency of coho smolts to out-migrate rapidly. The risk of predation by enhanced sockeye salmon on listed salmon and steelhead is low (SIWG 1984).

For the middle and upper Columbia River, large concentrations of hatchery fish (if present, given volitional release practices) may affect wild juvenile salmonids by stimulating predatory responses from bird, pinniped and non-salmonid fish predators (Steward and Bjornn 1990). This potential increase in predation on wild fish is most likely to occur at the head of reservoirs, the face of dams, at turbine spillways, or at bypass discharge areas. A potential benefit of the release of hatchery salmon, however, is that a mass of liberated hatchery fish moving through an area may confuse or distract predators, reducing predation on wild fish (NMFS 1995, 1999).

b) Competition -

Impacts from competition are assumed to be greatest in the spawning and nursery areas and at release locations where fish densities are highest (NMFS 1999). These impacts likely diminish as hatchery smolts disperse, but resource competition may continue to occur at some unknown, but lower level as smolts move downstream through the migration corridor.

Hatchery-produced smolts emigrate seaward soon after liberation, minimizing the potential for competition with wild fish (Steward and Bjornn 1990). NMFS (1996b) found that no adverse competition effects on co-occurring listed salmon would result from the release of hatchery smolts that begin migration immediately seaward after release. Competition between hatchery-origin salmonids and listed salmon and steelhead, in the mainstem corridor is judged not to be a significant factor.

c) Behavioral effects -

Hatchery salmon smolt releases may cause displacement of rearing wild salmon and steelhead juveniles from occupied stream areas. The presence of large numbers of hatchery fish may also alter wild fish behavioral patterns, which may increase their vulnerability to predation (NMFS 1999).

Release of only smolts from the hatchery programs will minimize temporal overlap between hatchery-released salmon and juvenile listed salmon and steelhead in the individual rivers and in the Columbia River mainstem. The release or out-planting of only volitionally migrating smolts by the hatcheries in the upper Columbia region will help decrease density-dependent effects on wild fish, such as niche displacement and “pulling”, leading to premature migration. Releases of hatchery salmon smolts coincident with managed releases of water from dams (water budget releases) will help accelerate

downstream migration of hatchery-released salmon, further reducing spatial and temporal overlaps with wild fish.

d) Disease transmission -
Hatchery liberations coincident with water budget releases and rapid out-migration of released hatchery smolts which limit the duration of interaction with wild fish, and adherence to fish disease control and minimization policies set forth for WDFW hatcheries (see IHOT (1996) Policy 403 - "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State"), significantly decrease the likelihood for transfer of disease from hatchery salmon to wild steelhead and salmon.

Under certain conditions, hatchery effluent has the potential to transport fish pathogens out of the hatchery, where natural fish may be exposed to infection. Interactions between hatchery fish and natural fish in the environment may also result in the transmission of pathogens, if either the hatchery or natural fish are harboring a fish disease. This latter impact may occur in tributary areas where hatchery fish are planted and throughout the migration corridor where hatchery and wild fish may interact. As the pathogens responsible for fish diseases are present in both hatchery and natural populations, there is some uncertainty associated with determining the source of the pathogen (Williams and Amend 1976, Hastein and Lindstad 1991). Hatchery-origin fish may have an increased risk of carrying fish disease pathogens because of relatively high rearing densities that the fish are subjected to in the hatcheries and resultant stresses to the fish. Under natural, low density conditions, most pathogens do not lead to a disease outbreak. When fish disease outbreaks do occur, they are often triggered by stressful hatchery rearing conditions, or by a deleterious change in the environment (Saunders 1991). Consequently, it is possible that the release of hatchery fish may lead to the loss of natural fish, if the hatchery fish are carrying a pathogen, if that pathogen is transferred to the natural fish, and if the transfer of the pathogen leads to a disease outbreak. Although hatchery populations can be considered to be reservoirs for disease pathogens because of their elevated exposure to high rearing densities and stress, there is little evidence to suggest that diseases are routinely transmitted from hatchery to wild fish (Steward and Bjornn 1990). Chapman et al. (1994) concluded that disease transmittal from hatchery to wild populations is probably not a major factor negatively affecting wild steelhead in the Columbia Basin.

To address concerns of potential disease transmission from hatchery to wild fish, the Pacific Northwest Fish Health Protection Committee (PNFHPC) has established guidelines to ensure that hatchery fish are released in good condition, thus minimizing impacts to natural fish (PNFHPC 1989). WDFW has also developed a Fish Health Manual that sets forth policies and procedures for the production of quality, healthy fish by the Department's Production Division (WDFW 1996). The WDFW manual also serves as a guide for training Fish Hatchery Specialists in fish culture and fish health practices. WDFW conducts frequent fish health inspections and adheres to disease prevention and control guidelines established by the PNFHPC and WDFW.

2. Estuarine effects -
The duration of interaction between hatchery salmon smolts and listed salmon and steelhead smolts in

the estuary is minimal. As noted previously, Dawley et al. (1986) reported movement rates of salmonids through the estuary and into the ocean that were similar to migration rates observed from release sites to the estuary. This finding indicates that the use of the Columbia River estuary by juvenile salmonids originating from upstream areas is limited in duration, compared to use documented for other west coast estuaries. Chapman et al. (1994a, 1994b), also reported that chinook and steelhead smolts move rapidly seaward through the Columbia estuary. However, although limited in duration, migrational timing overlap between hatchery yearling chinook salmon and steelhead has the potential to lead to negative effects on steelhead survival and growth through competition for food resources (Witty et al. 1995).

Sub-yearling fall chinook releases averaging less than 75 mm were reported to have the greatest potential to adversely affect through resource competition co-occurring salmonid species in pre-estuarine areas (Witty et al. 1995). As noted previously, Chapman et al. (1994b), quoting Conner et al. (1993), reported that sub-yearling chinook migratory behavior changes when a size of 85mm is reached, and fish exhibit a greater propensity to migrate. The recent ten year (1985-94) average size of sub-yearling fall chinook released from Priest Rapids Hatchery is 7.4 grams, which equates to an average length of 88 mm (WDFW Hatchery Program data, June 5, 1997). Sub-yearling chinook have generally been shown to concentrate in shallow nearshore areas in the estuary, while yearling steelhead concentrate in mid-river areas except early in the year (March-early May) (Dawley et al. 1986). Also, later release and out-migration timing, much smaller size at migration, and documented later peaks in abundance in the estuary for sub-yearling chinook (Dawley et al. 1986) further decrease the likelihood for significant interaction with steelhead smolts.

Release of smolts only from the three hatchery programs, and release of salmon coincident with water budget releases, are believed to reduce the duration of estuarine residence, thereby minimizing adverse effects on listed salmon and steelhead rearing or migrating through the area. Dawley et al. (1986) reported little or no cessation in migration rates in comparison to seaward rates measured upstream for sub-yearling chinook, yearling chinook and coho passing through the Columbia River estuary.

d. Level of incidental take -

The precise level of incidental take of listed salmon and steelhead resulting from juvenile salmon releases in the mid and upper-Columbia River regions is unknown. Quantification of mortality levels of juvenile listed salmon and steelhead is not possible, due to the inherent biological characteristics of the listed fish, the scale and variability of the Columbia Basin river systems, and the operational complexity of the subject hatchery actions. We believe that the above described impact minimization actions directed towards wild salmon and steelhead protection implemented in upper-river major hatchery operations, including volitional release practices and smolt-only releases, will lead to insignificant levels of incidental take.

No increases in annual salmon production in the region are proposed at this time. Release levels requested through this permit modification request will be the same as those in place when the annual

Basin-wide production ceiling was established (NMFS 1995). Production levels described here should therefore comply with those deemed by NMFS as appropriate to address ecological carrying capacity concerns and to minimize density-dependent effects on listed species.

(ii) Anticipated Impact on Habitat of Listed Salmon and Steelhead Stocks

1. Hatchery Discharge/Intake

The Chiwawa Ponds, Similkameen Pond, Carlton Pond, and Dryden Pond facilities discharge hatchery effluent directly into tributaries of the Columbia River. These complexes adhere to Clean Water Act Section 402 NPDES Permit requirements specific for each facility, that set forth allowable discharge levels and hatchery practices necessary to protect the environment. All facilities meet or exceed NPDES Permit requirements, and effects of discharges on listed salmon and steelhead in the individual hatchery drainages are therefore expected to be insignificant.

Dilution factors downstream of hatchery effluent discharge points will lead to further diminishment of already insignificant effects of hatchery effluent from the above facilities on mainstem habitat quality affecting listed salmon and steelhead. The Wells, Eastbank, Turtle Rock, and Priest Rapids fish hatchery facilities discharge effluent directly to the Columbia River. All of these facilities meet or exceed NPDES requirements. Total instantaneous discharge for the facilities are: Wells Hatchery - 83 cfs; Eastbank Hatchery - 53 cfs; Turtle Rock Hatchery - 35 cfs; Priest Rapids Hatchery - 117 cfs. The total Columbia River discharge at Rock Island Dam ranges from 150-300 kcfs during the outmigration period. At McNary Dam the total discharge ranges from 200-450 kcfs during the outmigration period. Hatchery effluent from the facilities located on the mainstem Columbia is greatly diluted and will have insignificant effects on outmigrating listed species and their habitat.

Hatchery water intakes that draw water from areas accessible to juvenile salmon or steelhead will be adequately screened to minimize effects to natural fish populations. Screens on such intakes will be maintained to ensure that they function properly in excluding fish.

Hatchery-reared sockeye fry are transferred from incubation trays to the Lake Wenatchee net-pens. The net-pens are open to the natural water circulation patterns in Lake Wenatchee. Net-pens containing the fray vary from 1/16 inch (starter mesh) to progressively larger mesh sizes. A typical starter configuration is a 1/16 inch mesh net measuring 20 ft x 10 ft x 10 ft deep (1,900 cu ft effective volume). The larger, grow-out pens have larger mesh sizes to facilitate circulation, with outside measurements of 20 ft x 20 ft x 20 ft depth, and approximately 7,400 cu ft effective volume. Net-pen fish rearing densities range from 0.023 lb/cu ft in early April (2 pens) at the start of the rearing period to 0.20 lb/cu ft (6 pens) just prior to the attainment of the target release size in October.

Influent and effluent gas concentrations in the Wenatchee net-pens, including dissolved oxygen

concentrations, are within parameters optimal for juvenile salmonid production and survival. Fish health and condition is monitored seven to nine times by fish health professionals during the five to six month rearing period to ensure that sockeye exhibit internal organ and body conditions that are standard for a healthy fish population. Fish health monitoring is in compliance with Co-manager Fish Health Policy standards (WDFW and WWTIT, 1998).

(iii) Steps Taken to Monitor, Minimize or Mitigate Impacts

1. Adult Collection

a. Impact Monitoring -

All salmonids encountered at WDFW hatchery trapping operations are identified to species and recorded in counts of abundance that are maintained in WDFW Hatcheries Program data bases (WDFW Form 5 - "Hatchery Adult Report"). Wild steelhead captured are readily identifiable because all hatchery-produced steelhead in Washington are mass-marked through removal of the adipose fin. The number of wild steelhead encountered during salmon broodstock efforts will be recorded on WDFW "Hatchery Adult Report" forms and will be made available to NMFS upon request. Coded-wire tag recoveries from chinook and steelhead will be analyzed to identify stock origin and, if applicable, stray rates of non-natal stocks.

b. Impact Minimization and Mitigation -

All trapping operations will be conducted consistent with broodstock collection protocols developed for each program. Traps will be checked at least daily for captured fish or monitored continuously during operation. All wild steelhead encountered in mid and upper-river hatchery operations will be held for a minimal duration in traps, and if not needed for recovery program propagation, will be released upstream without harm. Delay in migration and stress to any listed salmon and steelhead encountered will be minimized through these actions.

Rearing of each salmon species on parent river water, or acclimation to parent river water for several weeks prior to release is done to ensure a strong homing response to the hatchery release site, thus reducing the stray rate of hatchery-produced adult salmon to other drainages that may be important for wild salmon and steelhead production. Because the Turtle Rock Hatchery lacks an adult capture facility, salmon produced at the hatchery may stray to areas other than the release site. Salmon production groups at the five permitted hatchery complexes that are represented by coded-wire tags, including Turtle Rock, will continue to be evaluated with regard to various on-going studies of fisheries contribution, homing, and survival.

Details regarding how impacts on incidentally captured salmonids are minimized during salmon trapping operations are provided in appended HGMPs provided in Appendix I.

2. Juvenile Interactions -

a. Impact Monitoring -

Downstream smolt passage will continue to be monitored at smolt collection and bypass facilities at hydroelectric facilities on the Columbia River, and at smolt traps operated by the WDFW Production Division on Columbia River tributaries, to identify migration overlaps between listed salmon and steelhead originating from the Upper Columbia, Lower Columbia, and Snake River Basin ESUs, and unlisted upper Columbia River hatchery-produced salmon. Data collected in on-going smolt out-migrant trapping operations on the systems will also be used to identify time periods when ecological interaction between wild steelhead and salmon and hatchery releases are likely.

Hatchery performance will continue to be monitored on an annual basis through the IHOT process. Included in IHOT hatchery performance monitoring is the determination of the success of each operation in meeting wild salmonid impact reduction criteria (Appendix I - "Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.", IHOT 1996). Success in meeting smolt-only release, volitional release, and disease-free criteria will be among the factors monitored to gauge potential effects on listed salmon and steelhead.

b. Impact Minimization and Mitigation -

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size such that smoltification occurs within nearly the entire population, which reduces residence time in the streams after release (Bugert et al.1991). Volitional release practices are employed to foster the exodus of smolts from rearing ponds over extended time periods to reflect normal migratory behavior patterns, while unsmolted fish remain in rearing ponds to continue to feed and develop. Volitional release practices also act to reduce instantaneous densities of hatchery-reared fish in wild fish production areas, reducing potentially adverse density-dependent effects. Salmon releases will be timed with enhanced flow, spill, and fish passage actions coordinated through the Fish Passage Center and the various dam operators. Physiological measures, including allowable population fork length C.V. maximums, will be used to indicate when salmon should be allowed to enter the stream to maximize out-migration. Application of maximum allowable proportions of precocial males will indicate when fish should no longer be allowed to enter the stream to limit residualization.

Through these practices, the release and downstream passage of smolts will be maximized to insure that the population migrates seaward without delay, minimizing interaction with listed salmon and steelhead juveniles and smolts rearing and/or migrating in Columbia Basin freshwater and estuarine areas.

Where large scale (non-volitional) mass smolt releases become necessary, those releases will also be timed with enhanced flow/spill/passage enhancement activities coordinated through the Fish Passage Center and the various dam operators. Timing of releases with water budget flow release schedules will further accelerate seaward migration of released salmon, further reducing the duration of any interactions with wild fish. Rearing of hatchery salmon on parent river water, or acclimation of fish for several weeks to parent river water at each complex also will contribute to the smoltification process,

and reduced hatchery salmon residence time in the rivers and mainstem migration corridors.

No new salmon production is proposed for the upper Columbia River hatcheries through this take request. Production levels will remain in compliance with levels allowed under the annual Basin production ceiling set by NMFS (NMFS 1995). Effects on the ecological carrying capacity and density-dependent effects of hatchery production on listed fish will remain minimal through continued adherence to the NMFS production ceiling.

Adherence to WDFW fish disease control policies will reduce the incidence of diseases in hatchery fish produced and released, further decreasing the likelihood for disease transfer to wild salmon and steelhead. Fish health management programs affecting all stocks, and fish health activities specific for each complex, are detailed in Appendix I, under "Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread, or amplification of fish pathogens" (IHOT 1996).

Details are provided in HGMPs in Appendix I for each complex regarding methods used to minimize interactions with other fish populations through proper rearing and release strategies.

3. Habitat

a. Impact Monitoring -

Monitoring of hatchery effluent quality will continue to occur on a twice monthly basis, consistent with NPDES Permit requirements developed for each facility. Effluent quality data and reports will be maintained by WDFW and provided to the Washington Department of Ecology, the state agency authorized to regulate NPDES-permitted discharges into public waters of the state, as required. Performance information provided in annual IHOT reports will indicate the success of each hatchery operation in meeting impact minimization criteria for hatchery effluent. Water quality parameters monitored for each complex are reported in the "Environmental monitoring" section of IHOT (1996).

b. Impact Minimization and Mitigation -

Hatchery effluents currently meet NPDES Permit requirements and will continue to do so, minimizing the likelihood for adverse effects on listed salmon and steelhead in the upper Columbia tributary areas. Dilution factors in the upper Columbia mainstem migration corridor further reduce the likelihood for any adverse effects on listed salmon and steelhead populations in the mainstem river, or in the Columbia estuary. Further detail regarding effluent monitoring and impact minimization is provided in IHOT, Objective 5: Conduct environmental monitoring under "2. Proposed Activities".

(iv) Funding to Implement Impact Mitigation, Minimization, and Monitoring -

The Public Utility Districts (PUDs) and investor-owned utility within the upper Columbia River region are expected to continue to provide a significant share of funding necessary to accomplish the described impact mitigation, minimization, and monitoring activities. This funding is provided as a part of

mitigation agreements with the State of Washington for hydroelectric dam development and water withdrawals associated with the PUD and utility projects.

Additional funding that may be necessary to implement the above impact mitigation, minimization, and monitoring activities will be available from state budget sources. These sources include appropriations provided by the Washington State Legislature for WDFW biennial budgets, revenue from hunting and fishing license sales, and any matching federal funds secured by WDFW from NMFS, USFWS, or BPA budgets so designated over the next five years.

(v) Alternative Actions Considered

Closure or reduced production of some or all salmon (*Oncorhynchus* sp.) species reared and released at these facilities was considered. Based on the information detailed above, we believe that salmon releases and hatchery operations associated with the subject complexes will not adversely affect listed salmon and steelhead originating in the Columbia Basin to a significant degree. In addition, the chinook population preservation and restoration missions of the mid/upper Columbia hatchery programs were valued in considerations of alternative actions to reduce impacts on listed steelhead and salmon. Therefore, potential actions including closure or reduced production from the subject complexes as alternatives were rejected.

B. CONSERVATION PLAN FOR MINOR FACILITIES -

(I) Anticipated Impact on Listed Stocks

a) Adult Collection -

No mid or upper-Columbia River educational projects have adults returning, nor conduct trapping operations to collect returning broodstock. Cumulatively low salmon release levels from these operations will lead to low adult return levels, and hence low salmon straying levels to listed salmon or steelhead production areas. We believe that impacts to listed species due to broodstock collection operations and adult returns for these projects will be insignificant.

Level of incidental take -

Because there is no salmon broodstock collection operations at minor facilities, there will be no incidental take. The projects will have insignificant effects on listed salmon and steelhead.

b) Juvenile Interactions

All chinook salmon fry releases from educational programs above Bonneville Dam occur in May or June. There will be spatial and temporal overlap between the fry out-plants and listed salmon and

steelhead juvenile or smolt populations, but the combined total release numbers from these facilities are relatively small (6,000 fry per year). Impacts on listed salmon and steelhead resulting from releases from the educational projects should be insignificant. Chinook sub-yearlings that are planted into Lake Chelan for sport fishery enhancement are thought to remain in the lake and do not interact with listed salmon or steelhead in Columbia River Basin freshwater or estuarine areas.

Level of incidental take -
The level of incidental take of listed steelhead and salmon resulting from juvenile salmon releases in the mid and upper-Columbia River regions by educational and volunteer enhancement groups is unknown. Precise quantification of mortality levels of juvenile listed steelhead and salmon is not possible, due to the inherent biological characteristics of the listed fish, the scale and variability of the Columbia Basin river systems, and the operational complexity of the subject hatchery actions. We believe that the collectively small scale of salmon releases from the projects, and the predominant release of smolts only result in insignificant levels of incidental take. Public education and resource "ownership" resulting from these projects promotes recognition of the regional importance of salmonids, their habitat needs, and the need to maintain salmon abundance. These benefits should be valued in judgements regarding the acceptability of minor enhancement efforts in the region.

(ii) Anticipated Impact on Habitat of Listed Stocks

a) Hatchery Discharge/Intake
There is no release of hatchery effluent by volunteer projects above Bonneville Dam into habitats critical for listed salmon or steelhead production, rearing, or migration.

(iii) Steps Taken to Monitor, Minimize or Mitigate Impacts

a) Adult Collection
No adult salmon are collected at volunteer educational projects above Bonneville Dam, and no impact monitoring, minimization or mitigation actions are therefore necessary.

b) Juvenile Interactions
Allowable cumulative annual salmon fry release numbers are maintained at minimal levels to ensure that effects on listed salmonid species are insignificant.

c) Habitat
No effluent is released into critical salmon and steelhead habitat by these projects and no impact monitoring, minimization or mitigation actions are therefore necessary.

(iv) Funding to Implement Impact Mitigation, Minimization, and Monitoring -

The educational and volunteer cooperative rearing projects are funded primarily through private sources, including recreational fishing organizations and fish conservation organizations. Funding to implement impact mitigation, minimization, and monitoring will be provided by the individual organizations, with assistance from WDFW available through on-going hatchery production, stock assessment, research, and fisheries management activities in the regions.

(v) Alternative Actions Considered

Closure or reduced production of some or all species reared and released at these minor salmon educational and volunteer salmon enhancement facilities was considered. Based on the information detailed above, we feel that the possibility of adverse effects to the listed species is remote. The value of public education and the enhancement of resource stewardship responsibilities imparted by these projects are considered positive benefits to the preservation of salmonids and their habitat in the region. Therefore, the above alternative actions were rejected.

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VIII. Certification:

I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that this information is submitted for the purpose of obtaining a permit under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.

IX. Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Ross Fuller
Division Manager
Fish Management Division Chief
Washington Department of Fish and Wildlife
600 Capitol Way North
Olympia, WA 98501-1091

APPENDIX I

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

- Upper Columbia Summer Chinook Salmon Mitigation and Supplementation Program. Eastbank Fish Hatchery and Wells Fish Hatchery Complexes.

- Upper Columbia Fall Chinook Salmon Hatchery Program - Priest Rapids Hatchery Complex

- Lake Wenatchee Sockeye Salmon Supplementation Program. Rock Island Fish Hatchery Complex

APPENDIX II

Volunteer/Coop Releases